REMARKS

This Amendment is filed in response to the Final Office Action mailed Feb. 7th, 2005. All objections and rejections are respectfully traversed.

Claims claim 1-87 are in the case.

No claims have been added.

No claims have been amended.

Election/Restrictions

At paragraph 2 of the Office Action, the Examiner has issued a restriction requirement, asserting claim 86 is an independent and distinct invention, and withdrawing it from consideration. The Applicant respectfully traverses this restriction requirement and requests claim 86 be considered.

MPEP §806.05(d) provides that "the examiner must show, by way of example that one of the subcombinations has utility other than in the disclosed combination," and "[i]f applicant proves or provides an argument, supported by facts, that the other use, suggested by the examiner, cannot be accomplished or is not reasonable, the burden is on the examiner to document the viable alternative use or withdraw the requirement."

The Applicant respectfully asserts that claim 86 is not a separately usable invention and is not distinct from the other claims. Claim 86 is merely directed to electromagnetic signals propagating on a computer network for practicing the method of claim 42. The Applicant respectfully directs the Examiner's attention to the nearly identical phras-

ing of claim 86 and independent method claim 42. Specifically both claims contain the following identical limitations:

> storing data and row parity in stripes on a plurality of first storage devices, the stripes configured as rows of blocks on the first devices;
>
> defining diagonal parity sets that span the first devices;
>
> computing a diagonal parity for the diagonal parity sets; and
>
> storing the diagonal parity on a diagonal parity device, the diagonal parity device separate from the first storage devices, the storage array including the plurality of first storage devices and the diagonal parity device.

In an age of widespread digital downloads, a claim phrased in the manner of claim 86 is particularly relevant. Users commonly download firmware and drivers from Internet sites that modify or give new capabilities to devices they already own. Such firmware and drivers are embodied in downloadable code that is transferred across a network as electromagnetic signals. One can envision an entity offering a download that configures a user's device to perform the Applicant's novel invention. Accordingly, claim 86 is directed to this type of infringement, making an entity that transmits such a firmware or driver a direct infringer. While claim 86 is directed to protect against a different form of infringement, the invention embodied is clearly the same as the other claims.

The Applicant respectfully requests the Examiner withdraw the restriction requirement concerning claim 86 and reinstate the claim so that it may be considered on its merits.

Claim Rejections – 35 U.S.C. §103

At paragraph 2 of the Final Office Action, claims 1-85 and 87 were rejected under 35 U.S.C. 103(a) as being unpatentable over Han et al., U.S. Patent No. 6,158,017, issued on Dec. 5th, 2000 (hereinafter Han).

Applicant's invention, as set forth in representative claim 1 comprises in part:

> 1. A method for enabling recovery from two or fewer concurrent failures of storage devices in a storage array, the method comprising the steps of:
> providing the array with a predetermined number of storage devices, ***including a plurality of first devices configured to store data and row parity, and one diagonal parity device configured to store diagonal parity***, wherein the predetermined number of storage devices n is p+1 and wherein p is a prime number;
> dividing each device into blocks;
> organizing the blocks into stripes that contain a same number of blocks in each device, wherein each stripe comprises n-2 rows of blocks;
> ***defining the diagonal parity along diagonal parity sets that span the first devices***, wherein the diagonal parity sets wrap around within a group of n-2 rows so that all blocks belonging to diagonal parity sets of a stripe are stored in the stripe; and
> ***computing and storing the diagonal parity for all of the diagonal parity sets except one on the diagonal parity device.***

Han discloses two very different double parity arrangements, DH and DH2. The Examiner appears to have cited solely to the DH2 arrangement. Further, Applicant's review of the DH arrangement reveals it teaches far away from Applicant's invention[1]. Accordingly, the Applicant will direct discussion mainly to the DH2 parity arrangement.

[1] The DH arrangement is directed to an array of N disks, where N is a prime number, each disk divided into rows N-1 rows blocks. *See* col. 5, lines 21-25. Applicants claimed invention is for an array of n disks where n is "p+1 and wherein p is a prime number" and where the n disks are divided in "n-2 rows of blocks." This is the first of numerous dissimilarities which cause the DH parity arrangement to teach far away from Applicant's claimed invention.

The DH2 parity arrangement involves an array of N+1 disks, where N is a prime number, and each disk divided into N-1 rows of blocks. *See* col. 10, lines 64-66. A plurality of horizontal parity groups are defined, each horizontal parity group encompassing one row of the N-1 rows of blocks on disks 1 to N. *See* col. 11, lines 23-33 and col. 12, lines 51-60. A parity value for each horizontal parity group is stored in a corresponding block on the last disk of each row, i.e. disk N+1. *See* col. 12, lines 51-60 and Fig. 8. Further, a plurality of diagonal parity groups are defined, each diagonal parity group encompassing one diagonal stripe across the data blocks on disks 1 to N, but not across the horizontal parity blocks on disk N+1. *See* col. 13, lines 1-13 and Fig. 6. Diagonal parity values for every diagonal parity group are stored in the last row of data blocks across the disks 1 to N, i.e. all the disk except the horizontal parity disk. *See* col. 13, lines 1-13 and Fig. 6

The Applicant respectfully urges that Han is silent concerning the Applicant's claimed invention relating to "***including a plurality of first devices configured to store data and row parity,***" and "***one diagonal parity device configured to store diagonal parity,***" and "***defining the diagonal parity along diagonal parity sets that span the first devices,***" and "***computing and storing the diagonal parity for all of the diagonal parity sets except one on the diagonal parity device.***"

The disclosure of Han differs from Applicant's invention in three primary ways.

First, while Han discloses excluding its horizontal (row) parity disk from diagonal parity calculations, the Applicant novely teaches including the disk in the calculations. The Applicant defines ***"diagonal parity along diagonal parity sets that span the first de-***

vices" where the "first devices" includes both the data and row parity disks. By including an additional disk in diagonal calculation, the Applicant is able to, in part, achieve the advantages discussed below.

Second, while Han discloses calculating and storing a diagonal parity value for each and every diagonal parity group, the Applicant teaches "***computing and storing the diagonal parity for all of the diagonal parity sets except one on the diagonal parity device.***" Computing less diagonal parity values increases system performance and minimizes computational load over prior techniques such as Han. The Applicant further describes the advantages at page 20, lines 7-12 of the specification, stating:

> By encoding the diagonal parity blocks as shown in array 400, the system can recover from any two concurrent disk failures despite missing diagonal parity (P_8). This results from the fact that the row parity blocks are factored into the computations of the diagonal parity blocks stored on the diagonal parity disk DP. In contrast, the conventional EVENODD technique does not factor the row parity blocks into the computations of the diagonal parity sets.

Third, while Han discloses storing diagonal parity across all the disks the data disks of a disk array the Applicant teaches "***one diagonal parity device configured to store diagonal parity.***" Storing all diagonal parity on a single disk advantageously allows diagonal parity to be added to a system without modifying the data disks, as would be required by Han.

Accordingly, the Applicant respectfully urge that Han is legally insufficient to make obvious the presently claimed invention under 35 U.S.C. § 103 because of the absence of the Applicants' claimed novel "***including a plurality of first devices configured***

to store data and row parity," and ***"one diagonal parity device configured to store diagonal parity,"*** and ***"defining the diagonal parity along diagonal parity sets that span the first devices,"*** and ***"computing and storing the diagonal parity for all of the diagonal parity sets except one on the diagonal parity device."***

In the event that the Examiner deems personal contact desirable in disposition of this case, the Examiner is encouraged to call the undersigned attorney at (617) 951-3078.

All independent claims are believed to be in condition for allowance.

All dependent claims are believed to be dependent from allowable independent claims.

Applicant respectfully solicits favorable action.

Please charge any additional fee occasioned by this paper to our Deposit Account No. 03-1237.

Respectfully submitted,

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